Army Science and Technology (S&T) Overview

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Deputy Assistant Secretary of the Army for Research and Technology

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Agenda

- Vision
- Enterprise
- Strategy
- Resources
- Partnerships
- Summary

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Army S&T Principles and Vision

Foster innovation, maturation and demonstration of Technology Enabling Capabilities that Empower, Unburden and Protect the Warfighter of the future while exploiting opportunities to transition increased capability to the Current Force

Current Force

Advanced Affordable Turbine Engine

Combat Vehicle Armor Development

Enhanced Combat Helmet

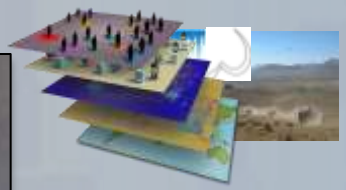
Advanced Rotary Wing Aerial Delivery Sling Load Net

Rapid Serial Visual Presentation

Enabling the Future Force

Enhancing the Current Force

Future Force

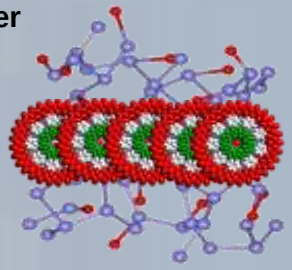


Cyber tools

Active Rotor

Wireless Power Transfer

High Energy Lasers



Disruptive Energetics

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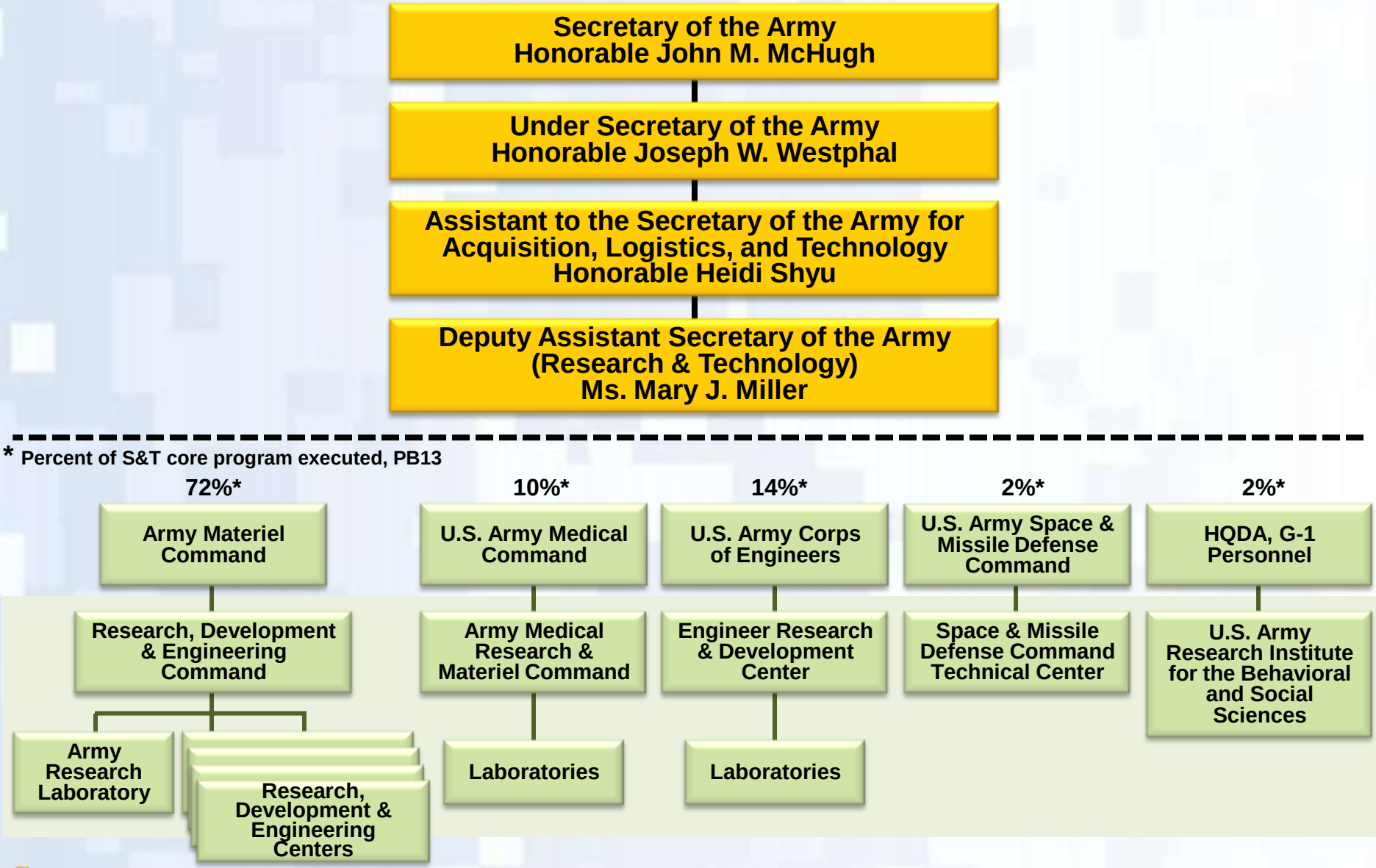
Army S&T Enterprise



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Office of the DASA(R&T)

Deputy Assistant Secretary of the Army (Research and Technology)

- Executive Director, Strategic Plans and Program Planning
- Executive Director, Programs and Technology Transition

Portfolios

- Director for Soldier Portfolio
- Director for Ground Portfolio
- Director for Air Portfolio
- Director for C3I Portfolio
- Director for Innovation Enablers
- Director for Basic Research

Initiatives

- Director for Warfighter Technology Implementation
- Director for Power & Energy

Functions

- Director for Lab Management & Educational Outreach
- Director for Business & Operations
- Director for International S&T Programs & Technology Transfer

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Army Enduring Challenges

- Greater ***force protection (Soldier, vehicle, base)*** to ensure survivability across all operations
- Ease ***overburdened*** Soldiers in Small Units
- Timely ***mission command & tactical intelligence*** to provide situation awareness and communications in <u>all</u> environments
- Reduce logistic burden of ***storing, transporting, distributing*** and ***retrograde*** of materials
- Create ***operational overmatch*** (enhanced lethality and accuracy)
- Achieve operational ***maneuverability*** in all environments and at ***high operational tempo***
- Enable ability to ***operate in CBNRE environment***
- Enable ***early detection*** *and* ***improved outcomes for Traumatic Brain Injury (TBI) & Post Traumatic Stress Disorder (PTSD)***
- Improve ***operational energy***
- Improve ***individual & team training***
- ***Reduce lifecycle cost*** of future Army capabilities

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How we prepare for an uncertain future…
Addressing the probable, possible, and unthinkable

Changing World

Multi-polar World
- Instability in key regions
- Proliferation of weapons
- Transnational threats

Interconnected World
- Climate change
- Resource Competition
- Energy Dependency
- Economic volatility

Unstable Regions
- Terrorist/pirate sanctuary
- Migration & illegal immigration

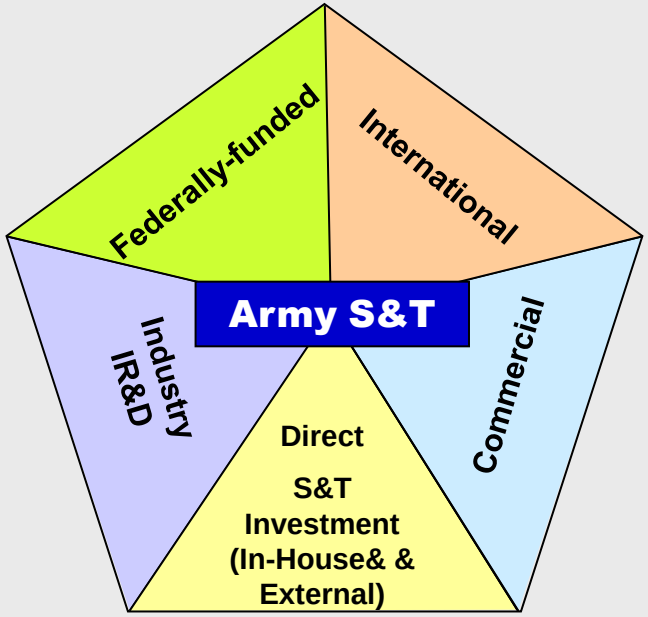
Changing Warfare

- Hybrid threats with innovative technology
- State & non-state actors
- Mix of kinetic & non-kinetic tactics
- Balance high-end and low-end capabilities

DoD Budget Pressure

- Declining RDT&E and procurement

INVEST WHERE WE MUST TO PROVIDE ARMY-SPECIFIC SOLUTIONS



LEVERAGE EVERYTHING ELSE

Dominating Warfighting Capabilities

Innovative Technology

World Class Labs

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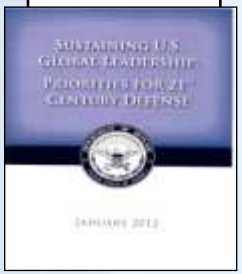
Sources Informing S&T Investment

Commercial

NGIC

DoD Priorities



"recalibrate its [U.S.'] capabilities and make selective additional investments in:"

- Counter Terrorism & Irregular Warfare
- Deter & Defeat Aggression
- Project Power Despite Anti-access/Area Denial Challenges
- Counter Weapons of Mass Destruction
- Operate Effectively in Cyber & Space
- Maintain a Safe, Secure & Effective Nuclear Deterrent
- Defend Homeland & Provide Support to Civil Authorities
- Provide Stabilizing Presence
- Conduct Stability & Counterinsurgency Operations
- Conduct Humanitarian, Disaster Relief, & Other Operations

Other Services

Army Capstone Concept

TRADOC Future Outlook

Desired Capabilities against a complex future environment in:

- Mission Command
- Intelligence
- Movement and Maneuver
- Fires
- Protection
- Sustainment
- Training and Leader Development
- Institutional Army
- Human Dimension

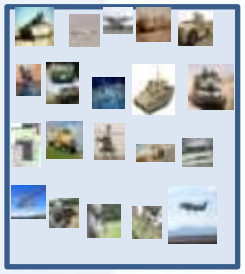
TRADOC Warfighter Outcomes, CNA, CBA, ICD, CDD, CPD

International/Allies

JCIDS

Maturation of Technologies for Acquisition Programs of Record or Planned Programs (Army G3/5/7 Capability Portfolio Reviews Roadmaps and Trades

CPR Roadmaps



PORs

JCAs

TTAs

BA4 Tech Maturation

Wargaming Exercises

Three things S&T must invest in:
1) What we do that no one else does (maintaining core competencies)
2) What we do to advance capabilities
3) What "big bets" that others invest in so we can counter

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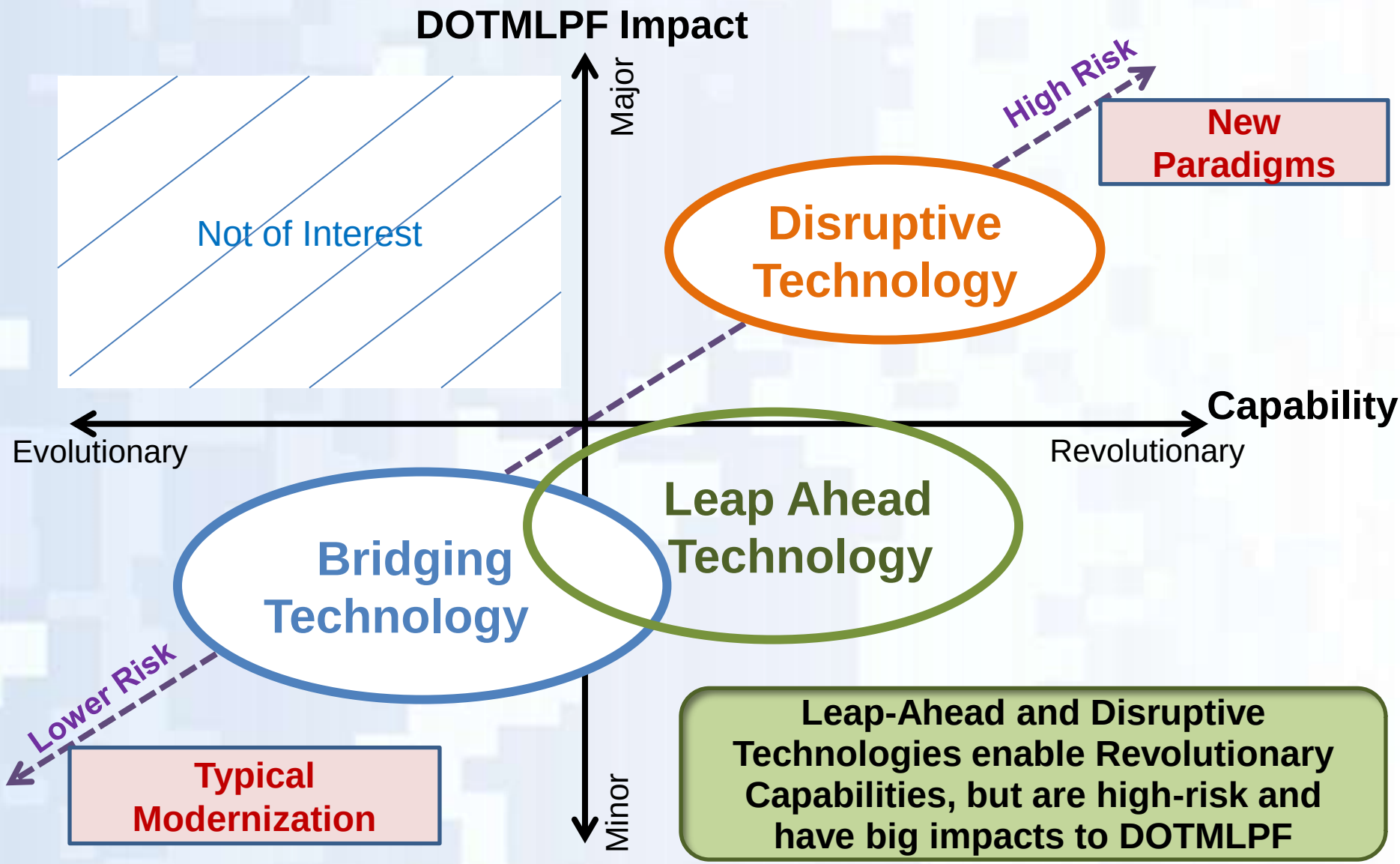
Technology Payoffs
Capability & Impact to DOTMLPF



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Army S&T Strategy

- Understand Army current and future capability needs
- Selectively invest to develop / adapt and mature technologies for Army unique needs
- Collaborate with and leverage other Services, agencies, international partners and the private sector
- Partner with PEO/PMs and rapid acquisition agents to facilitate technology transition
- Inform the development of realistic requirements and the basis of Requests for Proposals
- Inform and provide technology readiness guidance to acquisition programs
- Sustain a vital in-house workforce and laboratory infrastructure
- Communicate the vision and strategy to decision-makers, stakeholders, and our partners

Focus Science, Research, and Engineering Resources

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30-Year Modernization Approach

Intent: Conduct a 30-year portfolio analysis to assess strengths, weaknesses, understand opportunities vice threats, define critical capability gaps, refine Science and Technology (S&T) initiatives to close gaps (if not mitigated through other means), while balancing sustainment activities in order to gain a synchronized strategic modernization path for the Warfighter

Method:

1) Describe 30-year portfolio plan across the Acquisition Lifecycle Phases: Materiel Solution Analysis, Technology Development, Engineering and Manufacturing Development, Production and Deployment, Operations and Sustainment
2) Assess overmatch needs and threat vulnerabilities across 30-year plan
3) Assess S&T insertion opportunities throughout the 30-year period focused on maintaining overmatch
4) Link sustainment strategies to average age of platform, upgrade/engineering change timelines, and divestments; balance modernization with reset

Endstate: A synchronized modernization program, nested within the Army and National Military Strategies, that balances near, mid, and far term investments toward meeting the Army's top challenges and the diversity of threats we face today and in the future. Providing the right capability to the Warfighter at the right time.

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S&T Resources
Funding Categories, Work Focus, Timeframes

As of: PB14

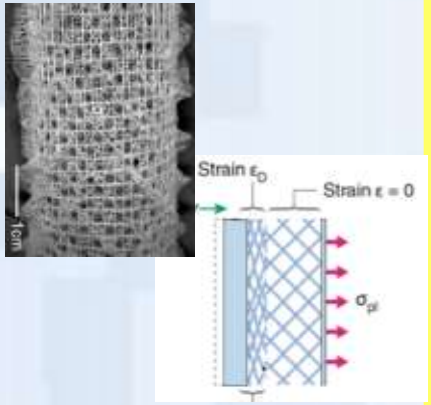
S&T (RDT&E BA 1-3) (1.7% TOA, 9.2% RDA)

Development (RDT&E BA 4-7) (4.5% of TOA, 24.1% of RDA)

Acquisition (Procurement Appropriation) (12.4% TOA, 66.7% RDA)

6.1: Basic Research (20% of S&T)

Nano/micro Assemblies



- Understanding to solve Army-unique problems
- Knowledge for an uncertain future

6.2: Applied Research (40% of S&T)

A+B & A/B Bonded Armor Concept

A = Hull Structure Armor

B_x = Laminate Composite Ceramic Armor

- Applications research for specific military problems
- Components, subsystems, models, new concepts

6.3: Advanced Technology Development (40% of S&T)

Combat Vehicle Armor Technologies

- Demonstrate technical feasibility at system and subsystem level
- Assess military utility
- Path for technology spirals to acquisition—rapid insertion of new technology

6.4: Technology Maturation Initiatives

- Funds tech maturation efforts, including competitive prototyping and experimentation in support of selected pre-Milestone B programs of record.

6.6: Technical Information Activities

- Advisory Bodies
- Reporting and Info Dissemination
- Studies and Tech Assessment

6.7: Manufacturing Technology

- Address manufacturing issues and facilitate affordable production of weapon systems and materials

Far Term	Mid Term	Near Term
12-20+ yrs	6-12 yrs	0-6 yrs

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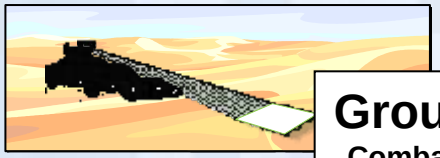
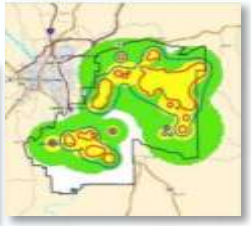
Army's S&T Portfolio*

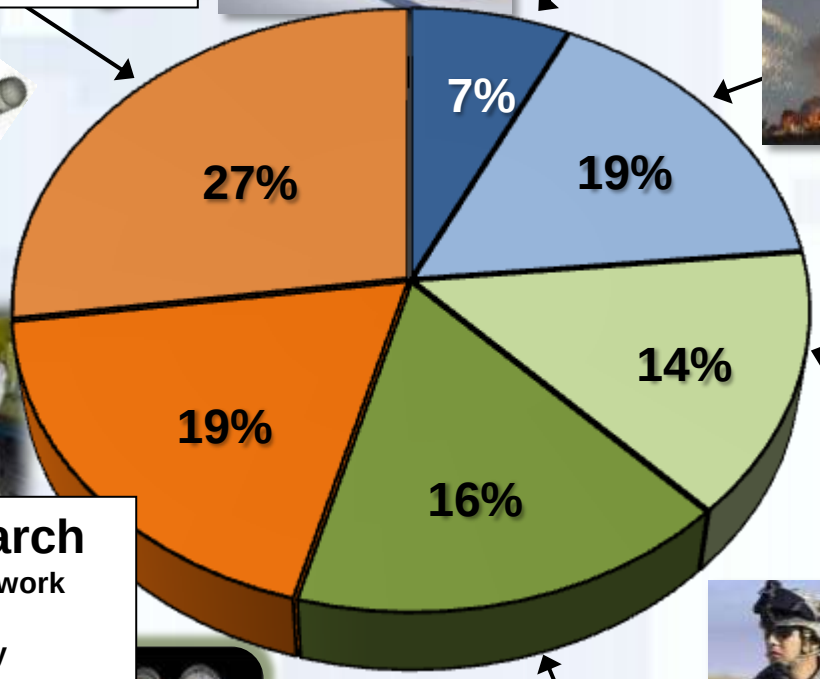


Ground
Combat/tactical ground platforms; ground-based missile systems

Air
Advanced air vehicles; unmanned aerial systems; manned/unmanned teaming

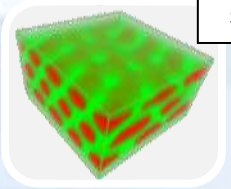
Innovation Enablers
High Performance Computing; Tech Maturation Initiatives; Environmental Protection; Base Protection; Studies

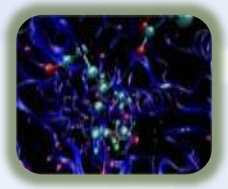




C3I
Secure Comms-on-the-move; cyber/EW; sensors

Basic Research
Neuroscience; network science, materials science; autonomy





Soldier
Survivability/medical protection and equipment: human dimension/systems; lethality; power & energy, training

*Source: Army Science and Technology Management Information System (ASTMIS) PB14

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Partnerships—Leveraging Other Services, Agencies, Academia, Industry & International R&D

Other Services
- Air Force
- Navy/USMC

Versatile, Affordable, Advanced Turbine Engine

PTSD treatment

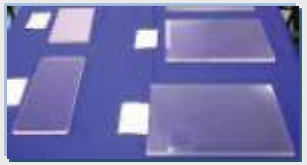
Agencies
- DARPA
- DTRA
- DoE labs
- DHS
- NIH
- NASA

Academia
- Georgia Tech
- MIT
- Penn State
- USC
- UMd
- UC System
- Delaware
- Michigan
- Arizona State

⋮

Industry
- Primarily technology development to create options for PMs
- Small Business Innovation Research—solutions from non-traditional sources
- Army Venture Capital Initiative—dismounted Soldier and vehicle power

Transparent Armor–Technology Assessment & Transfer, Inc.



International
- The Technical Cooperation Program (US, UK, CA, AUS, NZ)
- NATO Science & Technology Organization
- Bilateral Leadership Forums

Co-investment with UK to advance state-of-the-art in network science

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How can you help?

- "Defense Innovation Marketplace" website (www.DefenseInnovationMarketplace.mil)
- Some examples of technology areas of interest…
  - Lighter cheaper armor
  - Smaller cheaper seekers
  - More powerful energetics for propulsion & warheads that are insensitive munitions compliant
  - Enhanced autonomy (perception & behavioral logic)
  - Novel sensors, sensor deployment and data fusion to predict threat allowing Squad to set conditions in advance of threat action
  - Fire control sensors for Soldier weapons that determine range, track moving targets, and increase probability of hit
  - Solid state image intensification
  - Processing and algorithms to reduce data and information flow across networks

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Summary

- **Investments are aligned to Army needs-emphasis on the future with an "eye" on the present**
- **The Army S&T enterprise includes-Army laboratories, other Services and Agencies, academia, industry and international partnerships**
- **We will continue to have missions around the globe that require Soldiers to be equipped with the best technology to prevent, shape and win decisively**

S&T strategic investments provide options for an uncertain future-inventing the possible

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Army Science & Technology

Providing Soldiers Technology Enabled Capabilities

MAINTAINING A LEADING EDGE IN TECHNOLOGY